

Application No.: 10/829,002
First Named Inventor: Buijsse Bart
Response to Office Action of October 18, 2005
Amendment Dated: January 18, 2006
Attorney Docket No.: FNL0303US

Amendment to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of claims:

1. (currently amended) A particle-optical apparatus provided with a focusing device having an optical axis for the purpose of focusing a beam of electrically charged particles upon a focus position, which focusing device comprises:

- a magnetic lens for producing a focusing magnetic field with the aid of magnetic pole pieces;
- an electrostatic lens for producing a focusing electric field, in which the beam undergoes an energy change,

whereby the focusing electric field is placed upstream with respect to a region situated between the focusing magnetic lens and the focus position ,
characterized in that

- the magnetic lens is provided with ~~a permanent-magnetic material magnet~~ for generating the focusing magnetic field required for the lens action, and;
- said energy change has the form of an energy increase.

2. (previously presented) A particle-optical apparatus according to claim 1, in which there is a region present around the optical axis in which region both the focusing magnetic field and the focusing electric field are present.

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3. (previously presented) A particle-optical apparatus according to claim 1, in which the pole pieces of the magnetic lens include a sample-side pole piece that is made of electrically conductive material, and functions additionally as an electrode of the electrostatic lens.

4. (previously presented) A particle-optical apparatus according to claim 1, further comprising an adjustor for rendering adjustable the focus position that is to be held constant by the apparatus during imaging.

5. (previously presented) A particle-optical apparatus according to claim 2, in which the pole pieces of the magnetic lens include a sample-side pole piece that is made of electrically conductive material, and functions additionally as an electrode of the electrostatic lens.

6. (previously presented) A particle-optical apparatus according to claim 2, further comprising with an adjustor for rendering adjustable the focus position that is to be held constant by the apparatus during imaging.

7. (previously presented) A particle-optical apparatus according to claim 3, further comprising an adjustor for rendering adjustable the focus position that is to be held constant by the apparatus during imaging.

~~8. (new) A particle-optical apparatus according to claim 1 in which the focusing device~~
is configured for focusing a beam of electrons.

9. (new) A lens assembly for a particle optical apparatus, comprising:
a magnetic lens including a permanent magnet for producing a magnetic field for focusing a charged particle beam;
an electrostatic lens, the electrostatic lens producing an electric field for focusing the charged particle beam and altering its energy;

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the magnetic lens and the electrostatic lens being configured such that the focal position of the lens assembly remains substantially constant as the landing energy of the charged particle beam is varied.

10. (new) The lens assembly of claim 9 in which the electrostatic lens is configured to increase the energy of the charged particle beam as it passes through the electrostatic lens.

11. (new) The lens assembly of claim 9 in which at least a portion of the magnetic field overlaps with at least a portion of the electric field in a region of space.

12. (new) The lens assembly of claim 9 further comprising an adjustable magnetic lens for altering the focal position.

13. (new) The lens assembly of 12 in which the adjustable magnetic lens includes an electromagnetic lens.

14. (new) The lens assembly of claim 9 in which the lens assembly includes an optical axis and in which the electrostatic lens includes a tube through which the optical axis passes.

15. (new) The lens assembly of claim 9 in which the electrostatic lens includes a first tube portion and a second tube portion, a difference in electrical potential between the first tube portion and the second tube portion providing an electrostatic field acting on the charged particle beam.

16. (new) The lens assembly of claim 9 in which the magnetic lens includes two pole pieces.

17. (new) The lens assembly of claim 16 in which at least one of the pole pieces functions as part of the electrostatic lens.

18. (new) An electron microscope, comprising:

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First Named Inventor: Buijsse Bart
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an electron source; and

a lens assembly in accordance with claim 8.

19. (new) A method of making a charged particle beam system, comprising:

providing a magnetic lens including a permanent magnet to produce a magnetic field for focusing a charged particle beam;

providing an electrostatic lens, the electrostatic lens producing an electric field for focusing the charged particle beam and altering its energy;

configuring the magnetic lens and the electrostatic lens such that the focal position of the lens assembly remains substantially constant as the landing energy of the charged particle beam is altered by the electrostatic lens.

20. (new) The method of claim 19 in which

providing a magnetic lens for focusing a charged particle beam includes providing a magnetic lens for focusing an electron beam; and

providing an electrostatic lens for producing an electric field includes providing an electrostatic lens for focusing the electron beam and altering its energy.

21. (new) A method of operating a charged particle beam system, comprising:

directing a beam of charged particles through a magnetic focusing field originating from a permanent magnet;

directing the beam of charged particles through a focusing electrostatic field, the electric field increasing the energy of the charged particles, the electrostatic field and the magnetic field overlapping, the fields being configured such that the focal plane of the charged particle beam system remains substantially unchanged as the energy of the charged particle beam is altered.

Application No.: 10/829,002

First Named Inventor: Buijsse Bart

Response to Office Action of October 18, 2005

Amendment Dated: January 18, 2006

Attorney Docket No.: FNL0303US

22. (new) The method of claim 21 in which directing the beam of charged particles through a focusing electrostatic field includes directing the beam of charged particles through an electrostatic field that increases the energy of the charged particles.

23. (new) The method of claim 21 in which directing a beam of charged particles through a magnetic focusing field originating from a permanent magnet includes directing a beam of electrons through the magnetic focusing field.